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EXAMINER

EDMONDSON, LYNNE RENEE

ART UNIT	PAPER NUMBER
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1725

DATE MAILED: 02/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Advisory Action

Application No.

10/025,402

Applicant(s)

STOL ET AL.

Examiner

Lynne Edmondson

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--The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

THE REPLY FILED 10 November 2003 FAILS TO PLACE THIS APPLICATION IN CONDITION FOR ALLOWANCE. Therefore, further action by the applicant is required to avoid abandonment of this application. A proper reply to a final rejection under 37 CFR 1.113 may only be either: (1) a timely filed amendment which places the application in condition for allowance; (2) a timely filed Notice of Appeal (with appeal fee); or (3) a timely filed Request for Continued Examination (RCE) in compliance with 37 CFR 1.114.

PERIOD FOR REPLY [check either a) or b)]

- a) ☐ The period for reply expires _____ months from the mailing date of the final rejection.
- b) ☒ The period for reply expires on: (1) the mailing date of this Advisory Action, or (2) the date set forth in the final rejection, whichever is later. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of the final rejection. ONLY CHECK THIS BOX WHEN THE FIRST REPLY WAS FILED WITHIN TWO MONTHS OF THE FINAL REJECTION. See MPEP 706.07(f).

Extensions of time may be obtained under 37 CFR 1.136(a). The date on which the petition under 37 CFR 1.136(a) and the appropriate extension fee have been filed is the date for purposes of determining the period of extension and the corresponding amount of the fee. The appropriate extension fee under 37 CFR 1.17(a) is calculated from: (1) the expiration date of the shortened statutory period for reply originally set in the final Office action; or (2) as set forth in (b) above, if checked. Any reply received by the Office later than three months after the mailing date of the final rejection, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

1. ☐ A Notice of Appeal was filed on _____. Appellant's Brief must be filed within the period set forth in 37 CFR 1.192(a), or any extension thereof (37 CFR 1.191(d)), to avoid dismissal of the appeal.
2. ☐ The proposed amendment(s) will not be entered because:
- (a) ☐ they raise new issues that would require further consideration and/or search (see NOTE below);
 - (b) ☐ they raise the issue of new matter (see Note below);
 - (c) ☐ they are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal; and/or
 - (d) ☐ they present additional claims without canceling a corresponding number of finally rejected claims.

NOTE: _____

3. ☐ Applicant's reply has overcome the following rejection(s): _____.
4. ☐ Newly proposed or amended claim(s) _____ would be allowable if submitted in a separate, timely filed amendment canceling the non-allowable claim(s).
5. ☐ The a) ☐ affidavit, b) ☐ exhibit, or c) ☐ request for reconsideration has been considered but does NOT place the application in condition for allowance because: _____.
6. ☐ The affidavit or exhibit will NOT be considered because it is not directed SOLELY to issues which were newly raised by the Examiner in the final rejection.
7. ☒ For purposes of Appeal, the proposed amendment(s) a) ☐ will not be entered or b) ☒ will be entered and an explanation of how the new or amended claims would be rejected is provided below or appended.

The status of the claim(s) is (or will be) as follows:

Claim(s) allowed: _____.

Claim(s) objected to: 4-6, 8, 10, 19, 21, 22 and 30-32.Claim(s) rejected: 1-3, 7, 9, 11-18, 20 and 23-29.

Claim(s) withdrawn from consideration: _____.

8. ☐ The drawing correction filed on _____ is a) ☐ approved or b) ☐ disapproved by the Examiner.
9. ☐ Note the attached Information Disclosure Statement(s) (PTO-1449) Paper No(s). _____.
10. ☐ Other: _____

Lynne Edmondson
Primary Examiner
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DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-3, 7, 9, 25, 26, 28 and 29 are rejected under 35 U.S.C. 102(e) as being anticipated by Waldron et al. (USPN 6227433 B1).

Waldron teaches a method of joining a pair of overlapped aluminum components (col 4 lines 55-60) by providing a metal rivet (fastener 24) having a head (38) and a tip for entering into the components wherein the rivet is rotated while plunging into at least the first sheet. A joint is formed on solidification. The components have the same hardness (same material, same melting point) as the plug (col 3 lines 1-40). As shown in figure 1, the rivet tip (24) is pointed, however, the rivet can be any shape (col 4 lines 33-38). Three components or more may be joined with rivets introduced from above and below (col 4 lines 38-47). Although not shown in the drawings, the nature of the process is such that when the rivet exits the exterior side of the second component, a portion immediate adjacent the pointed part of the rivet will be raised. The rivet tip can extend through the second component or may be flush within the second component

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(col 3 lines 54-67 and col 4 lines 6-32). Parts are clamped in place on a backing anvil (25) (col 3 lines 15-22) with means for keeping the workpieces stationary (col 1 lines 16-20 and col 4 lines 47-55). The extended (protruding) rivet head is removed (col 2 lines 1-12 and col 4 lines 1-5). Although an aluminum article is connected with an Al rivet by friction welding, it is noted that an identical structure can be formed by other methods including conventional riveting which typically includes pre-drilling a hole and bolting. See also Waldron claims 1-10.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 11-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Waldron et al. (USPN 6227433 B1) in view of Takeshita et al. (USPN 6213379).

Waldron teaches a method of joining a pair of overlapped aluminum components (col 4 lines 55-60) by providing a metal rivet (fastener 24) having a head (38) and a tip for entering into the components wherein the rivet is rotated while plunging into at least the first sheet. A joint is formed on solidification. The components have the same hardness (same material, same melting point) as the plug (col 3 lines 1-40). As shown

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in figure 1, the rivet tip (24) is pointed, however, the rivet can be any shape (col 4 lines 33-38). Three components or more may be joined with rivets introduced from above and below (col 4 lines 38-47). Although not shown in the drawings, the nature of the process is such that when the rivet exits the exterior side of the second component, a portion immediate adjacent the pointed part of the rivet will be raised. The rivet tip can extend through the second component or may be flush within the second component (col 3 lines 54-67 and col 4 lines 6-32). Parts are clamped in place on a backing anvil (25) (col 3 lines 15-22) with means for keeping the workpieces stationary (col 1 lines 16-20 and col 4 lines 47-55). The extended (protruding) rivet head is removed (col 2 lines 1-12 and col 4 lines 1-5). Although an aluminum article is connected with an Al rivet by friction welding, it is noted that an identical structure can be formed by other methods including conventional riveting and bolting. However, the rivet configuration is not further disclosed.

Takeshita teaches a method of joining multiple Al sheets (figure 8, col 6 lines 44-56) and col 10 lines 8-13) by providing a metal rivet (10) having a head (11) and a tip (12) for entering into the components wherein the rivet is rotated while plunging into at least the first sheet, a joint is formed on solidification (col 6 lines 25-46 and col 10 lines 8-60). The rivet (plug) is formed of the same material as the components and would have the same hardness (col 6 lines 44-46, col 8 lines 49-54 and col 10 lines 8-13). As shown in figure 2B, the rivet comprises a pointed tip and a helical groove (thread) along an exterior surface. Although not shown in the drawings, the nature of the process is such that when the rivet exits the exterior side of the second component, a portion

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immediate adjacent the pointed part of the rivet will be raised (pushed outward, col 10 lines 49-53). The sheets are held by a clamp and a backing anvil (support) wherein the backing anvil comprises a recess which receives the extruded flash or raised portion (figure 11, col 6 lines 1-18, col 8 lines 38-44 and col 10 lines 25-34). The extended rivet tip or head (top or bottom of the plug) and flash may be removed to make the rivet flush with the upper and lower surfaces (col 5 lines 49-58 and col 10 lines 13-16 and lines 55-57). An alternate rivet comprises a bore (54) which extends partially through the rivet and a flange and lip (54, 54) which can hide and collect flash between the rivet and exterior sheet surface (figures 5A-5D and figure 7C). The bore may be used to attach another component (figures 8-10D and 12A-12D). As shown in figure 12 C the rivet (126) comprises a bore (124) which extends all the way through (col 8 lines 45-54). The rivet head comprises a shear portion (81) (col 8 lines 18-24). Although an aluminum article is connected with an Al rivet by friction welding, it is noted that an identical structure can be formed by other methods including conventional riveting and bolting. Although preheating workpieces prior to welding is known, there is no disclosure of preheating the Al components prior to plunging the rivet therein.

It would have been obvious to one of ordinary skill in the art at the time of the invention that the method is identical regardless of the shape of the rivet and a pointed, threaded rivet would be desirable for fastening components which have not been pre-drilled (Waldron, col 1 lines 21-35) to produce high strength, low weight components in a cost-effective manner (Waldron, col 1 lines 40-54). A rivet with a central bore would

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be lighter in weight. A rivet with a flange or flash hiding section would reduce stress concentrations (Waldron, col 1 lines 45-51).

5. Claims 12, 14-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Waldron et al. (USPN 6227433 B1) in view of Thomas et al. (USPN 5460317).

Waldron teaches a method of joining a pair of overlapped aluminum components (col 4 lines 55-60) by providing a metal rivet (fastener 24) having a head (38) and a tip for entering into the components wherein the rivet is rotated while plunging into at least the first sheet. A joint is formed on solidification. The components have the same hardness (same material, same melting point) as the plug (col 3 lines 1-40). As shown in figure 1, the rivet tip (24) is pointed, however, the rivet can be any shape (col 4 lines 33-38). Three components or more may be joined with rivets introduced from above and below (col 4 lines 38-47). Although not shown in the drawings, the nature of the process is such that when the rivet exits the exterior side of the second component, a portion immediate adjacent the pointed part of the rivet will be raised. The rivet tip can extend through the second component or may be flush within the second component (col 3 lines 54-67 and col 4 lines 6-32). Parts are clamped in place on a backing anvil (25) (col 3 lines 15-22) with means for keeping the workpieces stationary (col 1 lines 16-20 and col 4 lines 47-55). The extended (protruding) rivet head is removed (col 2 lines 1-12 and col 4 lines 1-5). Although an aluminum article is connected with an Al rivet by friction welding, it is noted that an identical structure can be formed by other methods

including conventional riveting and bolting. However, the rivet shape is not further disclosed.

Thomas teaches friction welding a fastener comprising a bore which extends through the rivet (probe, stud, 27) a flange (upper portion) and lip (figure 16 and col 9 lines 8-14). Alternate stud (probe) configurations comprise points (figure 13A) and partial bores (figure 15).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use a rivet shaped to remove flash, having features such as a central bore or flange, to facilitate removal of excess material and thereby provide a flush bonded surface with no stress risers for a mechanically superior, light-weight and cost-effective bond (Waldron, col 2 lines 1-14 and col 3 line 58 – col 4 line 5).

6. Claims 18, 20 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Waldron et al. (USPN 6227433 B1) in view of Aota et al. (USPN 6050474).

Waldron teaches a method of joining a pair of overlapped aluminum components (col 4 lines 55-60) by providing a metal rivet (fastener 24) having a head (38) and a tip for entering into the components wherein the rivet is rotated while plunging into at least the first sheet. A joint is formed on solidification. The components have the same hardness (same material, same melting point) as the plug (col 3 lines 1-40). As shown in figure 1, the rivet tip (24) is pointed, however, the rivet can be any shape (col 4 lines 33-38). Three components or more may be joined with rivets introduced from above and below (col 4 lines 38-47). Although not shown in the drawings, the nature of the

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process is such that when the rivet exits the exterior side of the second component, a portion immediate adjacent the pointed part of the rivet will be raised. The rivet tip can extend through the second component or may be flush within the second component (col 3 lines 54-67 and col 4 lines 6-32). Parts are clamped in place on a backing anvil (25) (col 3 lines 15-22) with means for keeping the workpieces stationary (col 1 lines 16-20 and col 4 lines 47-55). The extended (protruding) rivet head is removed (col 2 lines 1-12 and col 4 lines 1-5). Although an aluminum article is connected with an Al rivet by friction welding, it is noted that an identical structure can be formed by other methods including conventional riveting and bolting. However, there is no disclosure simultaneously riveting both exterior surfaces or of multiple rivets.

Aota teaches friction stir welding with two rotary tools for simultaneous welding of both (upper and lower) exterior surfaces (claim 6).

It would have been obvious to one of ordinary skill in the art at the time of the invention to employ multiple tools to simultaneously bond three or more workpieces (Waldron, col 4 lines 38-47) from multiple directions and thereby form secure, reliable bonds in a fast and cost-effective manner (Waldron, col 2 lines 12-14).

7. Claims 24 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Waldron et al. (USPN 6227433 B1) in view of Enomoto et al. (USPN 6344117 B2).

Waldron teaches a method of joining a pair of overlapped aluminum components (col 4 lines 55-60) by providing a metal rivet (fastener 24) having a head (38) and a tip for entering into the components wherein the rivet is rotated while plunging into at least

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the first sheet. A joint is formed on solidification. The components have the same hardness (same material, same melting point) as the plug (col 3 lines 1-40). As shown in figure 1, the rivet tip (24) is pointed, however, the rivet can be any shape (col 4 lines 33-38). Three components or more may be joined with rivets introduced from above and below (col 4 lines 38-47). Although not shown in the drawings, the nature of the process is such that when the rivet exits the exterior side of the second component, a portion immediate adjacent the pointed part of the rivet will be raised. The rivet tip can extend through the second component or may be flush within the second component (col 3 lines 54-67 and col 4 lines 6-32). Parts are clamped in place on a backing anvil (25) (col 3 lines 15-22) with means for keeping the workpieces stationary (col 1 lines 16-20 and col 4 lines 47-55). The extended (protruding) rivet head is removed (col 2 lines 1-12 and col 4 lines 1-5). Although an aluminum article is connected with an Al rivet by friction welding, it is noted that an identical structure can be formed by other methods including conventional riveting and bolting. However, there is no disclosure of clad members.

Enomoto teaches friction welding and mechanical fasteners to bond clad aluminum members (col 2 lines 20-41, lines 63-67 and col 5 line 61 – col 6 line 15).

It would have been obvious to one of ordinary skill in the art at the time of the invention that bonding clad materials would be an obvious variation of bonding unclad materials as excess will be removed. Whether clad or unclad, the process steps would be the same and a strong, lightweight bond would be formed (Waldron, col 2 lines 1-14 and col 3 line 58 – col 4 line 5).

Response to Arguments

8. In response to applicant's argument that the Waldron reference is silent as to the hardness of the fastener relative to the first and second components, see col 2 lines 26 and 27, which teach that the fastener can be made of the same material as the components thereby having the same hardness. The reference states "The fastener may be made of the same material as the workpieces or alternatively made of a material having a higher melting point temperature than that of the workpieces" in col 2 lines 26-36. A rivet made of the same material as the workpieces will presumably have a hardness "substantially similar to the hardness of at least one of the first and second components" as stated in instant claim 1 lines 10 and 11. It is further noted that the identical structure of article claim 25 can be formed by other methods including but not limited to pre-drilling a hole into which the rivet is plunge welded. While it is known that the same material can have a different hardness when subjected to heat treatments, there is no indication that either the workpieces or the rivet are subjected to such treatments and being the same untreated material would presumably have the same hardness. This would require an additional, intentional step. It is noted that the reference teaches a final flush position (the fastener penetrates substantially through the entire thickness of the lower workpiece, the plastic zone extending substantially to the lower surface thereof, col 3 lines 54-57). Formation of metallurgical bonds is inherent to the friction stir joining process, which includes friction plug joining. The

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reference teaches formation of a metallurgical bond in lines 9-14 of the abstract, figures 4-6, col 2 lines 19-25 and col 3 lines 54-59.

Therefore the 102 rejection of claims 1-3, 7-9, 25, 26, 28 and 29 as anticipated by Waldron stands. The 103 rejection of claims 12 and 14-17 as obvious over Waldron in view of Thomas, the 103 rejection of claims 11-17 as obvious over Waldron in view of Takeshita and the 103 rejection of claims 24 and 27 as obvious over Waldron in view of Enomoto stand.

9. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., a hole drilled through the component prior to welding) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Therefore the 103 rejection of claim 20 as obvious over Waldron in view of Aota stands.

10. In response to applicant's arguments regarding the Cearlock reference, it is noted that no rejections are made over this reference.

Allowable Subject Matter

11. Claims 4-6, 8, 10, 19, 21, 22 and 30-32 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

12. The following is a statement of reasons for the indication of allowable subject matter: The closest prior art teaches the invention essentially as claimed but teaches separate or integral (rivet configuration) flash removing means which are not linked to rotation means or a part of the apparatus. See Waldron (USPN 6067839) and Jenkins (EPN 0337813). By linking the flash removal device to a detachable rotation means, flash is continuously removed without interfering with the welding or solidification process thereby making the process faster and more efficient. Neither is a raised portion formed on the second surface of the second component in a process performed on a continuous part. See Takeshita (USPN 6213379). Conventionally a backing plate is used to prevent this type of defect or the rivet tip resides outside of rather than within the second component and hole drilling is typically avoided in friction welding as it causes stress. See Waldron (USPN 6227433).

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Thomas et al. (GB 2306366, helical groove, tip configurations),

Luc (USPN 4144110, multiple simultaneous tools), Chakrabarti et al. (US 2002/0121319 A1, preheating, friction stir) and Mahoney et al. (USPN 5975406).

14. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynne Edmondson whose telephone number is (571) 272-1172. The examiner can normally be reached on Monday through Thursday from 6:30 a.m. to 5 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Dunn can be reached on (571) 272-1171. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Lynne Edmondson
Primary Examiner
Art Unit 1725

 2/12/09

LRE